Forest Research Notes

Northeastern Forest Experiment Station

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THE HICKORY RUN DEER EXCLOSURE

The damage that deer can do to both planted and natural tree seedlings is vividly demonstrated by a 1/10-acre fenced exclosure at Hickory Run State Park in Carbon County, Pennsylvania. Here, by comparing the growth of trees that have been browsed by deer with the growth of trees that have been protected from deer by the fence, one can see the injurious effects of browsing strikingly revealed.

HISTORICAL

According to Park Superintendent John J. McGinley, the area where the plot is located had once been farmed, and is believed to have been abandoned at least 35 years ago. Very little woody vegetations grew up during the next 15 years. The exclosure was then built (about 1938) to see whether better establishment and growth of the native trees would occur under protection from deer.

During the next decade, some scattered scrubby hardwoods, mostly gray birch and aspen, became established both in the plot and outside, but the stocking was sparse and spotty. In 1950, the area was planted to red, pitch, and a few white pines. The protected plot was planted with red pines at the same time and at the same spacing as outside.

Today a number of the red pines planted outside the fence are dead and gone, and the survivors are misshapen and still short because of continued browsing by deer. Their average height is only 2½ feet. In contrast, the protected red pines inside the fence are tall and well-formed; some are 17 feet tall and the average is 11 feet (fig. 1). Both pitch and white pines, which were planted only in the unprotected area, are even shorter and more heavily browsed than the unprotected red pines.

Figure 1.--The small red pine trees on the right have been stunted by deer browsing; the large ones on the left have been protected by the fence. All were planted at same time.

DAMAGE FROM BROWSING

To get a measure of the damage done by deer to both planted and natural trees, the trees were tallied by heights inside the exclosure and on an unfenced but otherwise similar plot nearby. All trees on the unprotected plot were recorded; inside the exclosure all pines were recorded but, because of the dense growth, only a 50-percent sample of the natural hardwoods was taken. Three large trees in the exclosure that apparently antedated the fencing were not tallied. The tally data are summarized in table 1.

As compared to the protected trees inside the exclosure, the trees outside have suffered substantially in both numbers and height growth because of deer browsing.

Both timber values and aesthetic values have been severely damaged.

Table 1.--Average number of trees per acre and average heights, by species, inside and outside the exclosure

Species	Stems per acre		Average height	
	Inside	Outside	Inside	Outside
	Number	Number	Feet	Feet
Red pine	769	560	11.0	2.5
White pine	0*	40	0*	1.5
Red oak	55	0	10.8	0
Black cherry	272	20	4.2	1.0
Red maple	304	40	2.9	1.0
Beech	96	0	2.3	0
Bigtooth aspen	64	0	6.0	0
Quaking aspen	1330	0	3.8	0
Gray birch	2820	620	4.9	5.2
Serviceberry	240	80	5.1	1.2

*None planted.

DEER DESTROY OWN FOOD SUPPLY

Another result of severe browsing by deer is their tendency to destroy their own food supply. Their critical period is in the winter, when they must depend on woody browse for subsistence. An excessive number of deer in an area may consume the woody browse faster than it can grow in the summer, whereas fewer deer will permit an increasing amount of suitable browse to be produced.

This is demonstrated on the fenced plot--more trees of all species (except white pine) were found inside the fence than outside. Some of these species, as well as certain shrubs, were not found anywhere outside the fenced plot.

A better measure of available browse than number of stems, however, is the amount of twiggy crown within reach of deer. To measure this, woody plant crowns under 5 feet in height were tallied on line-point transects both inside and outside the fence (table 2). (The percentages for the fenced plot add up to more than 100 because some crowns overlapped.) Outside the fence, 85 percent of the area had no woody plant cover under the 5-foot level, as compared to only 21 percent inside the fence.

WHAT IT MEANS

The tree growth inside this exclosure shows that, had there been no deer--or even substantially fewer deer--to browse in this area, the area could have been planted suc-

Table 2.--Percent of total area under 5 feet high occupied by woody plant crowns inside and outside the exclosure

Species	Inside	Outside
	Percent	Percent
Red pine	46	3
Red oak	2	0
Black cherry	1	*
Aspen	9	0
Gray birch	16	13
Other tree species	2	*
Willow (shrubs)	4	0
Meadowsweet	2	*
Blackberry	6	1
Dwarf sumac	2	0
Blueberry	16	6
Bush-honeysuckle	4	0
Wild raisin	1	0

*Observed but did not occur on sampling points.

cessfully, or would have restocked to native tree species even without planting. The fact that the area outside the fence remains poorly stocked is incontrovertible evidence of an excessive deer population.

Such excessive deer populations are generally recognized by foresters throughout Pennsylvania--and elsewhere--as a common nuisance. And wherever they occur, as on the study area described here, regeneration of the forest is dramatically impeded and deer habitat continues to deteriorate.

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